Mad-Roaring-Mills Restoration Project: Aquatic Effects Analysis

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For: Entiat Ranger District, Wenatchee National Forest
Date: December 14, 2021

Issues Addressed

This section includes issues pertaining to aquatic resources that have been identified for detailed analysis. "An issue is a statement of cause and effect linking environmental effects to actions" (FSH 1909.15).

Issue 1: There are areas within the project area where stream channel conditions do not provide high quality habitat for aquatic species. In-stream restoration work will have a short-term negative impact to ESA-listed fish species and other native fish species. This section focuses on the long-term benefit from these actions and short term impacts are discussed further in the Mad-Roaring-Mills Restoration Project Fisheries Biological Evaluation (Mayfield 2022; available in the project folder). Additionally, direct effects to ESA-listed fish species will undergo Section 7 consultation with USFWS and NMFS prior to implementation.

Issue 2: Project area road densities are high and are potentially increasing sedimentation in streams, reducing fish access to suitable habitat by acting as barriers to migration, and degrading stream and riparian habitat by occupying and simplifying riparian habitat.

Issue 3: Water quality may be affected by project activities. A high density road network can result in accelerated erosion and sediment delivery to streams. Other activities such as prescribed fire and vegetation management may result in, or reduce the risk of, accelerated erosion and sediment delivery. High intensity wildland fire can result in accelerated erosion and sediment delivery in the short term that is orders of magnitudes higher than activity related causes.

Methodology

The extensive road network is one of the primary drivers impairing current watershed and aquatic ecosystem function. Current road conditions and their potential impacts on watershed and aquatic habitat conditions were assessed. Restorative road treatments are a priority for the Mad-Roaring Mills Restoration Project Area.

Whole Watershed Restoration Procedures Methodology (Roads)

The road assessment procedure used the Draft Okanogan-Wenatchee Whole Watershed Restoration Procedures (WWRP) (USDA 2015). This process identifies where road-stream impacts are potential and roads or groups of roads that would benefit hydrologic process to remove or hydrologically close.

Since land management activities affecting watershed function are generally not distributed evenly across watersheds, the roads analysis looked at road-stream interactions at a smaller sub-watershed scale to identify where road-stream impacts are likely to be high. For this analysis, 6th field Hydrologic Units (HUC12) were used as shown in Figure 1 in the Environmental Assessment.

This procedure incorporates geomorphic and ecological principles associated with road impacts in existing watershed and aquatic resource restoration planning mechanisms at varying spatial scales (i.e. Robinson et al. 2010 and Rosgen 2006). The physical road indicators assessed include road density, increase in drainage network (artificial streams) from the road system, riparian road density (density of roads within 300 feet of streams), and the number of road crossings per stream mile. These indicators are used to identify where potential road impacts are high and as a proxy to measure the degree of impacts or impairment roads pose to watershed and aquatic resources. High, moderate, and low rankings were assigned to different the indicators based on scientific literature related to road-watershed and aquatic habitat impacts. A rating for each subwatershed was calculated and assigned a color value based on potential road-stream interaction magnitude and to some degree, a level of departure from historic conditions (see table below).

Table 1. Subwatershed metrics and ranking criteria.

Metric	Subwatershed Ranking Criteria	Subwatershed Road-Stream Interaction
Subwatershed Road density	0-1 mi/mi^2	Low
	1-2.4 mi/mi^2	Moderate
	>2.4 mi^2	High
Riparian Road Density	0-1 mi/mi^2	Low
	1-2.4 mi/mi^2	Moderate
	>2.4 mi^2	High
Increase in drainage network from the road system	< 10%	Low
	10-30%	Moderate
	> 30%	High
Riparian Road Length to Stream Length Ratio	0-0.10	Low
	0.11-0.30	Moderate
	>0.30	High
Road crossings per stream mile	0-1	Low
	1-3	Moderate
	>3	High

Resource Indicators and Measures

Resource Indicator: Miles of Stream Restored

Many streams in the project area have been impacted by human development, such as floodplain restriction due to road construction, and restoration opportunities were assessed using local expert knowledge and the Lower Mad River Reach Assessment (Inter-Fluve 2018). This resource indicator assesses the total stream miles that have been identified for in-stream restoration work, such as floodplain enhancement, side channel reconstruction, and engineered log jam structures.

Resource Indicator: Miles of Increased Stream Access for Fish

Addressing connectivity and increasing range of existing populations is a high priority, cost-effective approach to protecting and restoring fish populations. Improving connectivity can increase habitat

diversity and population resilience. This can reduce effects of climate change-induced reductions in stream flow and increases in temperature. For this indicator, the miles of stream access restored by removing or upgrading existing barriers to allow for all fish passage will be assessed. This indicator will help assess the potential improvements to existing fish populations associated with the proposed action.

Resource Indicator: Road Density

Using GIS, road density was calculated at the subwatershed scale using all open road miles (maintenance level 2-5, unauthorized roads, private roads, and other ownership) divided by square miles of land within each project area subwatershed. For the project effects analysis, change in road density was compared between the existing condition, and proposed action alternatives. Changes in road density were discussed with the assumption that reduced road densities would be a beneficial effect to hydrologic and aquatic resources at the subwatershed scale.

Resource Indicator: Riparian Road Density

The density of road segments within 300 feet of streams was calculated as proxy for road-stream impacts such as sediment sources, loss of instream wood recruitment, and channel constriction. Riparian road density was calculated by the ratio of miles of roads within 300 feet of streams to the square miles of area within 300 feet of streams, by sub-watershed. For the project effects analysis, riparian road density was compared between the existing condition, and proposed action alternatives. To assess for overall impacts from road densities, this indicator was analyzed in conjunction with the overall road density indictor, described above.

Resource Indicator: Number of Road-Stream Crossings and Road Crossings per Stream Mile

The stream crossings per mile metric was calculated as the total stream crossings (fords, culverts, bridges) within each catchment by the total miles of streams. For the project effects analysis, stream crossing density was compared between the existing condition, no-action alternative, and proposed action alternatives. Changes in stream crossing density from the proposed road treatments were discussed in context of how it changed the indicator at the catchment scale and would change hydrologic and aquatic resource conditions at the subwatershed scale.

Resource Indicator: Increase in Drainage Network due to Roads

Increase in drainage network from the road system was calculated using miles of road that are hydrologically connected to the stream network based on spatial terrain analysis, road position and slope and potential connectivity to the stream system. Hydrologically connected roads present the greatest risk to the hydrologic system and are the primary focus of treatments to improve watershed condition in subwatersheds of the project area. For the project effects analysis, the changes in the increase of the drainage network due to roads was compared between the existing condition and proposed action alternatives.

Resource Indicator: Riparian Road Length to Stream Length Ratio

The ratio of road network within riparian reserves to stream length was calculated as length of road in riparian reserves divided by the total stream length in the subwatershed. Similar to the increase in drainage network from the road system, this metric is a measure of the potential for the road system to

impact the stream network and riparian habitat. For the project effects analysis, the changes in riparian road length to stream length ratio was compared between the existing condition and proposed action alternatives.

Resource Indicator: Intrinsic Sediment Delivery Potential

Soils within the project area have varied erosion hazards and susceptibility to accelerated erosion due to project activities, or wildland fire. Intrinsic sediment delivery potential was calculated as the number of acres of soils susceptible to erosion. Comparison between the existing condition and proposed action alternatives reflects the reduction in potential for high intensity wildland fire and fire effects.

Table 2. Resource condition indicators and measures for assessing effects

Issue	Indicator or Measure	Source
Improve habitat conditions for fish, including threatened steelhead and bull trout, endangered spring Chinook, and other aquatic species.	Miles of stream restored	NWP; ACS
	Miles of increased stream access for fish	NWP; ACS
Reduce road density to improve riparian, aquatic and terrestrial plant and wildlife habitat quality and utilization.	Open road density, by subwatershed	NWP; ACS
	Open riparian road density, by subwatershed	NWP; ACS
	Number of road-stream crossings and road crossings per stream mile	NWP; ACS
Potential project effects to water quality	Increase in the drainage network due to roads	NWP; ACS
	Riparian road length to stream length ratio	NWP; ACS
	Intrinsic sediment delivery potential, by subwatershed	NWP; ACS

Environmental Consequences

Impact topics have been selected for this analysis based on their potential to affect important resources and other key issues identified during planning. Because of the inherent uncertainty involved with adaptive management strategies, analyses in this section are qualitative assessments based on review of scientific literature and information collected by the field specialists and provided by other agencies.

Context of Effect

- Direct—an effect that is caused by and occurs at the same time and place as the proposed activity. This could be an affect to individual fish or an aquatic or hydrologic habitat indicator like stream flow or instream wood levels.
- Indirect—a reasonably foreseeable effect that is caused by the proposed activity, but occurs later in time or farther removed in distance. Examples include increased fine sediment levels in fish habitat from blading roads or increased base flows from increasing beaver habitat.

Type of Effect

- Beneficial—Moves the system to or towards desired conditions (water yield, peak flows, sediment yield, nutrient yield or stream system response, and stream channel morphology) and fish abundance improves or maintains robust local populations. For example, replacing barrier

culverts would improve fish access to spawning habitat, moving the project area closer to desirable fish habitat conditions and increase local population abundance.

- Adverse—Moves the system outside of or away from the desired conditions (water yield, peak flows, sediment yield, nutrient yield or stream system response, and stream channel morphology) and fish abundance improves or fish abundance improves or maintains robust local populations. An example would be soil compaction in RRs would lead to increase runoff patterns and reduced base flow conditions.

Duration of Effect

- Short-term—an effect that would not be detectable within a short amount of time, generally within hours to a few weeks after the proposed activity has been carried out. For example, dropping trees into a stream would temporarily increase suspended sediment levels, but it would be undetectable after a few hours.
- Long-term—a change in a resource that will not return to its condition prior to the activity for the foreseeable future. An example includes completely removing overstory trees along a stream could increase stream temperature for years.

Effect Intensities

- Negligible: A change that would be so small that it would not be of any measurable or perceptible consequence. Aquatic or hydrologic resources would not be affected or the effects on these resources would not be detectable. An example includes opening a closed road that does not cross any streams or wetland areas.
- Minor: A change that would be small and localized and of little consequence. Effects on aquatic or hydrologic resources would be detectable, although these effects would be localized, short-term, and inconsequential. An example would be the sediment effects generated from replacing a single stream culvert using BMPs.
- Moderate: A change that would be readily apparent and measurable, localized, and possibly long-term. Measurable effects could include a substantial sediment delivery disturbance, removal of large amounts of riparian trees, the reduction of multiple stream crossings in drainage area, or securing viable fish distribution through installation of larger culverts or aquatic organism passage pipes. Mitigation measures proposed would help off-set adverse effects.
- Major: A noticeable change to a physical resource that would be measurable and result in a substantial adverse or beneficial impact. Effects on hydrologic resources would be readily apparent, measurable, severe, long-term, and felt on a regional scale. Substantial watershed features would be removed or the physical properties significantly altered. Mitigation measures proposed to offset adverse effects would be extensive and success would not be assured.

Environmental Consequences of No Action

Direct and Indirect Effects of No Action

Resource Indicator: Miles of Stream Restored

The no action alternative would not provide any in-stream restoration and fish-bearing stream habitat would continue to be degraded and impacted by human development. The effect of not completing this work would have **long-term, direct, minor, adverse** impacts to stream habitat in the project area.

Resource Indicator: Miles of Increased Stream Access for Fish

There are several complete and partial barriers to fish passage within the project area. With the no action alternative, suitable habitat would continue to be inaccessible to fish and may lead to isolated fish populations. The effect of not removing or replacing fish barrier structures would have a **long-term, direct, minor, adverse** impact on fish distribution and fish population viability.

Resource Indicator: Road Density

All three subwatersheds in the project area have high open road densities (>2.4 mi/mi^2). The existing levels of road densities have a high likelihood of impacting stream conditions and watershed processes. With no action, there will be **long-term, indirect, moderate, adverse** effects to watershed conditions and stream conditions.

Resource Indicator: Riparian Road Density

All three subwatersheds in the project area have high open riparian area road densities (>2.4 mi/mi^2). The existing levels of road densities have a high likelihood of impacting stream conditions and watershed processes. With no action, there will be **long-term, indirect, moderate, adverse** effects to watershed conditions and stream conditions.

Resource Indicator: Number of Road-Stream Crossings and Road Crossings per Stream Mile

While the existing number of road-stream crossings per mile is considered low (<1 per stream mile) in each subwatershed, there is a high total number of crossings. With the no action alternative, these crossings will continue to have a **long-term, direct, minor, adverse** impact to stream and watershed conditions.

Resource Indicator: Increase in Drainage Network due to Roads

All three subwatersheds in the project area have increases in the drainage network due to roads. Lower Mad River and Roaring Creek subwatersheds have potential increases in the drainage network of 27.3% and 29.9% respectively and are considered to be functioning at risk for this indicator. Mills Creek – Entiat River subwatershed has a potential increase of 42.3% and is considered to be not functioning for this indicator. With no action there will be **long-term, indirect, direct, moderate, and adverse effects** to watershed conditions, water quality and quantity, and stream conditions.

Resource Indicator: Riparian Road Length to Stream Length Ratio

All three subwatersheds in the project area have increases in the ratio of riparian road length to stream length. Lower Mad River and Roaring Creek subwatersheds have riparian road length to stream length ratios of 0.28 and are considered to be functioning at risk for this indicator. Mills Creek – Entiat River subwatershed has a riparian road length to stream length ratio of 0.4 and is considered to be not functioning for this indicator. With no action there would be **long-term, indirect, moderate, and adverse effects** to watershed conditions, water quality and quantity, riparian habitat and stream conditions.

Resource Indicator: Intrinsic Sediment Delivery Potential

Acres of soils within the project rated as being susceptible to accelerated erosion and sediment delivery are shown in the table below. With no action there would be potential **long- term, indirect, moderate, and adverse** effects to watershed conditions and water quality were high severity wildland fire occur on the untreated acres.

Subwatershed	Low (kwfact <0.2)	Med (kwfact .2 to .27)	High (kwfact >.27)
Lower Mad	9920 ac.	2607 ac.	4095 ac.
Roaring Creek	9424 ac.	377 ac.	7644 ac.
Mills Creek–Entiat R.	12598 ac.	3948 ac.	14516 ac.

Environmental Consequences of the Proposed Action

Direct and Indirect Effects of the Proposed Action

Resource Indicator: Miles of Stream Restored

The proposed action has identified 3.8 miles of potential in-stream work to restore fish habitat. This includes project areas on the Mad River and Roaring Creek, with the focus being to restore floodplain connection and provide a variety of stream habitat types. This will have a **long-term, direct, moderate, beneficial** effect on in-stream habitat on fish bearing streams in the project area.

Resource Indicator: Miles of Increased Stream Access for Fish

The project will upgrade or removal barriers on both fish bearing and non- fish bearing streams. The proposed action will restore access to 1.0 miles of occupied fish habitat on Tamarack Creek which will allow for existing westslope cutthroat trout populations to be more viable. The project will also remove barriers on several streams currently without fish populations but with suitable habitat. A total of 2.5 miles of suitable habitat will be restored within the project area. The project will have a **long-term, direct, moderate, beneficial** effect on fish distribution and stream access in the project area.

Resource Indicator: Road Density

This project will reduce total open road densities in all three subwatersheds and change their ranking from have a “high” impact to a “moderate” impact. By reducing total open road densities, there will be a **long-term, indirect, moderate, beneficial** effects on watershed processes, indicators, and stream habitat.

Resource Indicator: Riparian Road Density

This project will reduce riparian area open road densities in all three subwatersheds. Two subwatersheds (Lower Mad and Roaring Creek) will change their ranking from have a “high” impact to a “moderate” impact. Mills Creek-Entiat River has a higher number of private or other ownership roads, so, while the total riparian area road density will be reduced, the subwatershed will still be considered to have “high” impacts from the roads. By reducing total open riparian road densities, there will be a **long-term, indirect, moderate, beneficial** effects on watershed processes, indicators, and stream habitat.

Resource Indicator: Number of Road-Stream Crossings and Road Crossings per Stream Mile

This project will reduce the number of road-stream crossings in all subwatersheds (a total of 29 crossings removed). The number of road crossings per stream mile is considered low in all subwatersheds and would decrease slightly. Removal of the road crossings may have a **direct, short-term, minor, adverse** effect on stream sediment levels but applicable design criteria will ensure the effects are minor. The reduction in stream crossings would have a **long-term, direct, minor, beneficial** effect on watershed and stream conditions.

Resource Indicator: Increase in Drainage Network due to Roads

This project would reduce the increase in the drainage network due to roads in all three watersheds. While Lower Mad and Roaring Creek subwatersheds would still be considered "functioning at risk" for this indicator, they would see a 4% and 3.9% decrease in the drainage network resulting from the interaction of roads and the stream system. Similarly, Mills Creek – Entiat River would continue to be "not functioning" but it would experience a 7.9% reduction of the increase in drainage network indicator. By reducing the increases in the drainage network due to road interactions with the stream system, there would be **long-term, indirect, moderate, and beneficial** effects to watershed and hydrologic processes.

Resource Indicator: Riparian Road Length to Stream Length Ratio

This project would reduce the riparian road length to stream length ratio indicator in all three watersheds. While Lower Mad and Roaring Creek subwatersheds would still be considered "functioning at risk" for this indicator, they would see the ratio of riparian road length to stream length decrease from 0.28 to 0.24 (Lower Mad) and from 0.28 to 0.25 (Roaring Creek). Similarly, Mills Creek – Entiat River would continue to be "not functioning" but it would see the ratio of riparian road length to stream length reduced from 0.4 to 0.32. By reducing the ratio of riparian road length to stream length, there would be **long-term, indirect, moderate, and beneficial** effects to watershed, riparian, and hydrologic processes.

Resource Indicator: Intrinsic Sediment Delivery Potential

This project would reduce the risk of high severity wildland fire leading to increased sediment delivery by treating the vegetation and fuels on approximately 10,795 acres in the project area. In particular, on soils with high erosion and sediment delivery risk, Lower Mad and Roaring Creek would see a reduction of acres susceptible to erosion and sediment delivery to streams due to high intensity wildland fire of 2153 acres and 1056 acres respectively. While Mill Creek-Entiat River would see a reduction of acres susceptible of 386 acres, these acres would be treated with mechanical thinning and piling which carries a risk of soil disturbance. Design criteria would be affective at reducing this risk. By treating the vegetation and fuel loading within the project units, there would be **long-term, indirect, moderate, and beneficial effects** to the subwatersheds and water quality within the project area.

Subwatershed	Low (kwfact <0.2)	Med (kwfact .2 to .28)	High (kwfact >.28)
Lower Mad	4790 ac.	1607 ac.	2153 ac.
Roaring Creek	610 ac.	0 ac.	1056 ac.
Mills Creek–Entiat R.	159 ac.	34 ac.	386 ac.

Table 3. Aquatics Resource Indicators

Issue	Indicator or Measure	No Action/Existing Condition	Action Alternative
Improve habitat conditions for fish, including threatened steelhead and bull trout, endangered spring Chinook, and other aquatic species.	Miles of stream restored	0.0 miles	3.8 miles
	Miles of increased stream access for fish	0.0 miles	3.5 miles (1.0 miles on fish-bearing streams; 2.5 miles on streams with potential to be fish-bearing)
Reduce road density to improve riparian, aquatic and terrestrial plant and wildlife habitat quality and utilization.	Open road density, by subwatershed*	Lower Mad River: 2.56 mi/mi^2 Mills Creek-Entiat River: 3.04 mi/mi^2 Roaring Creek: 2.54 mi/mi^2	Lower Mad River: 1.97 mi/mi^2 Mills Creek-Entiat River: 2.05 mi/mi^2 Roaring Creek: 2.09 mi/mi^2
	Open riparian road density, by subwatershed*	Lower Mad River: 2.47 mi/mi^2 Mills Creek-Entiat River: 3.52 mi/mi^2 Roaring Creek: 2.50 mi/mi^2	Lower Mad River: 2.13 mi/mi^2 Mills Creek-Entiat River: 2.82mi/mi^2 Roaring Creek: 2.10 mi/mi^2
	Number of road-stream crossings and road crossings per stream mile*	Lower Mad River: 37; 0.76 per mile Mills Creek-Entiat River: 85; 0.99 per mile Roaring Creek: 27; 0.58 per mile	Lower Mad River: 29; 0.60 per mile Mills Creek-Entiat River: 69; 0.81 per mile Roaring Creek: 22; 0.47 per mile
	Increase in drainage network due to roads	Lower Mad River: 27.2% increase Mills Creek-Entiat River: 42.3% increase Roaring Creek: 29.9% increase	Lower Mad River: 23.3% increase Mills Creek-Entiat River: 34.4% increase Roaring Creek: 26% increase
	Riparian road length to stream length ratio	Lower Mad River: 0.28 Mills Creek-Entiat River: 0.4 Roaring Creek: 0.28	Lower Mad River: 0.24 Mills Creek-Entiat River: 0.32 Roaring Creek: 0.25
	Intrinsic sediment delivery potential	**Lower Mad River**: 4095 acres high, 2607 moderate intrinsic potential **Mills Creek-Entiat River:** 14516 acres high, 3948 moderate intrinsic potential **Roaring Creek:** 7644 high, 377 moderate intrinsic potential	**Lower Mad River:** Treats 2399 acres high and 340 acres moderate intrinsic potential ground reducing risk **Mills Creek-Entiat River:** Treats 167 acres high intrinsic potential ground reducing risk **Roaring Creek:** Treats 1176 acres high intrinsic potential ground reducing risk

*Color ranking refers to the potential impact to watershed processes. See Table 1 for metrics and rankings.

Consistency with Relevant Laws, Regulations, and Policy

Land and Resource Management Plan

The Wenatchee National Forest Land and Resource Management Plan (forest plan), as amended by the Northwest Forest Plan, provides standards and guidelines for the Mad-Roaring-Mills Restoration Project.

The WNF designated Riparian-Aquatic Habitat Protection Zones (EW-2), which included standards and guidelines to maintain and enhance habitat conditions and viability for fish species. The NWFP amended the WNF-LRMP, and designated Riparian Reserves management areas that overlay the EW-2 management areas. As stated in the ROD for the NWFP, standards and guidelines from the WNF plan continue to apply where they are more restrictive or provide greater benefits to late successional forest related species as well as S&G from the NWFP.

The proposed action prescribes management actions within EW-2, Riparian Reserves and Key Watersheds. Standards and guidelines from the WNF and NWFP were reviewed prior to project development and integrated into the project design for all alternatives. The proposed action is consistent with this direction. The nine Aquatic Conservation Strategy (ACS - NWFP) objectives, which provide watershed direction that is intended to restore and maintain the ecological health of watersheds, aquatic ecosystems and water quality on National Forest lands, will be met under the proposed action and complete discussion of compliance is in the Mad-Roaring-Mills Restoration Project Fisheries Biological Evaluation (Mayfield 2022) in the project record. The Management Indicator Species (MIS) fish species identified in the WNF-LRMP would continue to persist as viable populations under the proposed action.

Other Relevant Law, Regulation, or Policy

Clean Water Act (1977)

The principle federal law pertaining to hydrology impacts is the Clean Water Act (CWA), as represented collectively by The Water Quality Act of 1987 (PL100-4), The Clean Water Act of 1977 (PL95-217) and the Federal Water Pollution Control Act Amendments of 1972. The CWA characterizes water pollution from forest land-use activities as “non-point-source pollution”, and describes the use of best management practices (BMPs) as the most effective means of preventing and controlling non-point-source pollution. It also establishes state roles in water-resource classification, development of water quality standards, and identification of waters that are unlikely to comply with those standards. All relevant BMPs will be followed to ensure compliance with the Clean Water Act.

Endangered Species Act (1973) and Critical Habitat

Through federal action and by encouraging the establishment of state programs, the 1973 Endangered Species Act provided for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend. Section 7(a)(2) of the Endangered Species Act (ESA) of 1973 (as amended) requires all federal agencies to review actions authorized, funded or carried out by them to ensure such actions do not jeopardize the continued existence of any listed species. Consultation of actions will occur using the Aquatic Restoration Biological Opinion II or the Okanogan-Wenatchee National Forest Programmatic. Table 4 summarizes the potential effects of the project to ESA-listed fish species. Full description of effects available in the project Biological Evaluation (Mayfield 2022).

Table 4. Potential effects to ESA-listed and other species status fish species.

	Effects of Alternatives			
	Species Present in Project Area	**Habitat Present in Project Area**	**Existing Condition**	**Proposed Action**
Endangered Species Act Listing				
Upper Columbia Spring Chinook (*Oncorhynchus tshawytscha*)- Endangered & Critical Habitat	Yes	Yes	Ongoing cumulative impacts	Short term LAA during project implementation, Long term Benefit
Upper Columbia Steelhead- (*O. mykiss*)- Threatened & Critical Habitat	Yes	Yes	Ongoing cumulative impacts	Short term LAA during project implementation, Long term Benefit
Columbia River Bull Trout- (*Salvelinus confluentus*)- Threatened & Critical Habitat	Yes	Yes	Ongoing cumulative impacts	Short term LAA during project implementation, Long term Benefit
Regional Forester's Special Status Species Listing				
Pacific lamprey (*Entosphenus tridentatus*)	Unknown	Potential	Ongoing cumulative impacts	MIIH
Lake Chub (*Couesius plumbeus*)	No	No	NI	NI
Pygmy whitefish (*Prosopium coulterii*)	No	No	NI	NI
Westslope Cutthroat trout (*O. clarkii lewisi*)	Yes	Yes	Ongoing cumulative impacts	MIIH
Inland Columbia Basin Redband Trout (*O. mykiss gairdneri*)	Yes	Yes	Ongoing cumulative impacts	MIIH
Magnuson-Stevens Fishery Conservation and Management Act Listing				
Chinook (*O. tshawytscha*)- EFH	Yes	Yes	Ongoing cumulative impacts	MAA, Long term benefit
Coho (*O. kisutch*)- EFH	No	No	N/A	N/A
Forest Plan Management Indicator Species				
Spring Chinook (*O. tshawytscha*)- MIS	Yes	Yes	Ongoing cumulative impacts	Short term LAA during project implementation, Long term Benefit
Summer Chinook (*O. tshawytscha*)- MIS	Yes	Yes	Ongoing cumulative impacts	Short term LAA during project implementation, Long term Benefit
Sockeye Salmon- (*O. nerka*)- MIS	No	No	Ongoing cumulative impacts	N/A
Steelhead- (*O. mykiss*)- MIS	Yes	Yes	Ongoing cumulative impacts	Short term LAA during project implementation, Long term Benefit
Bull Trout- (*Salvelinus confluentus*)- MIS	Yes	Yes	Ongoing cumulative impacts	Short term LAA during project implementation, Long term Benefit
Westslope Cutthroat - MIS	Yes	Yes	Ongoing cumulative impacts	Short term LAA during project implementation, Long term Benefit

Magnuson-Stevens Fishery Conservation and Management Act:

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 1996 (as amended) requires the identification of Essential Fish Habitats (EFH) for Federally managed fishery species and the implementation of measures to conserve and enhance this habitat as described in Federal Fishery Management Plans (FMP's). Federal agencies are required to review actions authorized, funded or carried out by them to ensure that such actions do not negatively affect any EFH (those waters and substrate necessary to fish for spawning, breeding or growth to maturity). Federal fisheries within the

middle and upper Columbia basin which are covered under the MSA (Pacific Coast Salmon FMP) include; chinook and coho (*O. kisutch*). The proposed action will not negatively affect any EFH in the project area. See Table 4 for a summary and Mayfield (2022) for additional information.

Executive Orders

Executive Order (EO) 11990 (protection of wetlands) requires federal agencies to

> *"minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands..."*

EO 11988 (protection of floodplains) requires federal agencies to

> *"restore and preserve the natural and beneficial values served by floodplains…"* and to *"evaluate the potential effects of any actions it may take in a floodplain…."*

Forest Service Manual (FSM) 2500

- Chapter 2530 Watershed Management directive establishes the framework for sustaining water quality and hydrologic function while providing goods and services outlined in forest and grassland land management plans.
- Chapter 2550 Soil Management directive establishes the framework for sustaining soil quality and hydrologic function while providing goods and services outlined in forest and grassland land management plans.

State and Local Law

Washington State water quality standards that are applicable to this project are Washington Administrative Code, Title 173, (WAC 173-201A-600).

Water Quality Standards

The State of Washington has designated the streams draining NFS lands to the Columbia watershed as Antidegradation Segments. This indicates that the existing water quality is better than the established standards for the designated beneficial uses. Water quality is required by state regulation to be maintained at this level. State antidegradation rules require that water quality not be lowered to any measurable extent (e.g. not more than 5 Nephelometric Turbidity Units [NTU] for turbidity, background under 50 NTU) where feasible methods exist to prevent or significantly reduce that effect. Even where measurable lowering of water quality is being prevented, antidegradation rules require that no activity cause or contribute to a violation of the numeric turbidity criteria or harm the existing or designated uses established in the state standards for the specific water bodies.

Classification and designation of water quality uses and standards for the area encompassed by the project area is extracted from the State of Washington "Use designations – Fresh Waters" (WAC173-201-600) (Washington 2011). Waters within the analysis area are protected for the uses of salmonid spawning, rearing, and migration; primary contact recreation; domestic, industrial, and agricultural water supply; stock watering; wildlife habitat; harvesting; commerce and navigation; boating; and aesthetic values. Since the waters are on NFS lands, they are additionally protected for the designated uses of "Core summer salmonid habitat" and "extraordinary primary contact recreation".

The proposed action is compliant with Washington water quality standards. All in-water work will follow the guidelines in the WDFW-USFS MOU and a WDFW habitat biologist will be consulted with prior to in-stream work.

Conclusion

The Mad-Roaring-Mills Restoration Project is expected to improve water quality, riparian function and channel morphology, and watershed condition. The proposed action would reduce total open road density and riparian open road density in all project area subwatersheds. In addition, the proposed action would remove 29 road-stream crossings, improve 3.8 miles of instream fish habitat, and restore access to 3.5 miles of current and potential fish habitat. Through these actions, watershed condition would be improved through a reduction in erosion and sedimentation from the road system, improvement in stream and riparian condition, and through vegetation treatments to reduce the risk of effects to water quality and watershed condition from high severity fires.

References Cited

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